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Executive Summary

The Berkeley Material Recovery/ Waste Conversion Facility

March 15, 1982

submitted by
PB-Vicon Recovery Systems
A Joint Venture of Parsons Brinckerhoff Development Corporation and Vicon Recovery Systems, Inc.

submitted to
City of Berkeley, California
Department of Public Works

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PB-Vicon Recovery Systems
10 Park Place, Butler Center
Butler, New Jersey 07405
Tel. (201) 492-1000

March 15, 1982

Mr. Michael J. Baumann, Project Manager
Department of Public Works
CITY OF BERKELEY
2180 Milvia Street
Berkeley, California 94704

Dear Mr. Baumann:

We are pleased to submit this proposal to the City of Berkeley for the design, construction, operation, financing and ownership of the Materials Recovery/Waste Conversion Facility (MR/WCF). Our joint venture, comprised of Vicon Recovery Systems, Inc. and Parsons Brinckerhoff Development Corporation, possesses the full range of capability and experience to deliver to the City a facility which will reinforce its current recycling efforts and extend them with the new dimension of energy recovery.

The PB-Vicon team proposes to implement a waste-to-energy system to process the guaranteed minimum of 72,000 TPY with the ability to process up to 130,000 TPY. The same technology, developed by Enercon Systems, Inc. of Cleveland, has been operating successfully for over a year at Pittsfield, Massachusetts. That plant has exceeded its performance requirements and has met the environmental standards of the Commonwealth of Massachusetts. We offer dependable, rugged technology and are prepared to stand behind it.

In preparing our proposal, we have had several discussions with local energy and material customers, private haulers, landfill operators and environmental leaders. We were greatly impressed with the dedication shown to resource recovery and recycling. We hope that our facility will enhance the program, and we have included in our proposal a specific alternate of mechanical front-end separation to increase the yield of material recycling. In the implementation process, we intend to cooperate fully with those involved in the recycling program.


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We have followed your RFP outline closely and believe we have complied with all your requirements. It should be noted that the Technical Proposal illustrates a facility which would process 130,000 TPY with additional redundancy. This configuration would be constructed only if higher guarantees of waste were made by the City. The Cost Proposal and Proposal Price are based on a facility sized for the current guarantee. If there is any further information needed, or clarification desired, please don't hesitate to call upon us.

We look forward to working closely with the City to make waste-to-energy a reality in Berkeley. We are fully committed to resource recovery and we know that Berkeley is also. The facility that can result from our joint efforts will reflect that commitment and give the City a leadership position in the nation's resource recovery arena.

Very truly yours,

PB-VICON RECOVERY SYSTEMS

Joseph J. Domas, Partner
President, Vicon Recovery Systems, Inc.

Arnold S. Greenhut, Partner
Executive Vice President
Parsons Brinckerhoff Development Corporation

/hb

GENERAL PROCESS DESCRIPTION

Receiving:

After weigh-in commercial and city collection vehicles will enter the transfer station through doors on the south side, unload and proceed to 2nd Street exit.

Public vehicles will proceed past the scale house and unload at the east side of the transfer station under the building canopy.

Weekend traffic indicates a need for additional public unloading areas, therefore, portable dividers will be repositioned allowing additional public access to city and commercial areas.

Vehicles containing known sources of waste will be directed to specific unloading doors, so that waste may be categorized to assist in affective blending and pre-separation for recycling.

A mobile radio communication system will be utilized to maintain contact with weighmaster, control room and frontend loader operator for additional information on disposal truck positioning.

Refuse Movement & Loading:

All refuse will be unloaded within the transfer station as previously described in Section 1.1. Frontend loaders will segregate waste for separation and reclamation. Recyclable materials will be temporarily stored in rolloff bins within the transfer station. When full, these containers will be transported to, and unloaded at, appropriate buyer's facilities. The remaining refuse

will be blended and transported to incinerator loading hoppers by the rubber tire frontend loaders. Loading of the incinerator hoppers will be controlled by the frontend loader operator at the direction of the control room operator and the automatic sequencing of the incinerator loading cycle.

Ash from the incinerator discharge will be deposited in roll-off bins located in the ash handling area of the waste conversion facility. These containers will be loaded on trailer transfer carriers and dumped at the appropriate landfill.

The waste recovery facility contractor will supply all necessary bins for ash removal and storage of recyclable materials. Two trailer mounted rolloff hoists will be supplied by the waste recovery facility contractor and serve to move containers within the facility and to landfill and recycle buyers. Standardization of containers will eliminate the need for additional specialized equipment.

The tractors supplied by the transfer station contractor will be coupled with these special trailers and give a great degree of versatility to the material movement system. Transfer trailers supplied by the transfer station contractor will be utilized for bulk material recycling.

PROCESSING

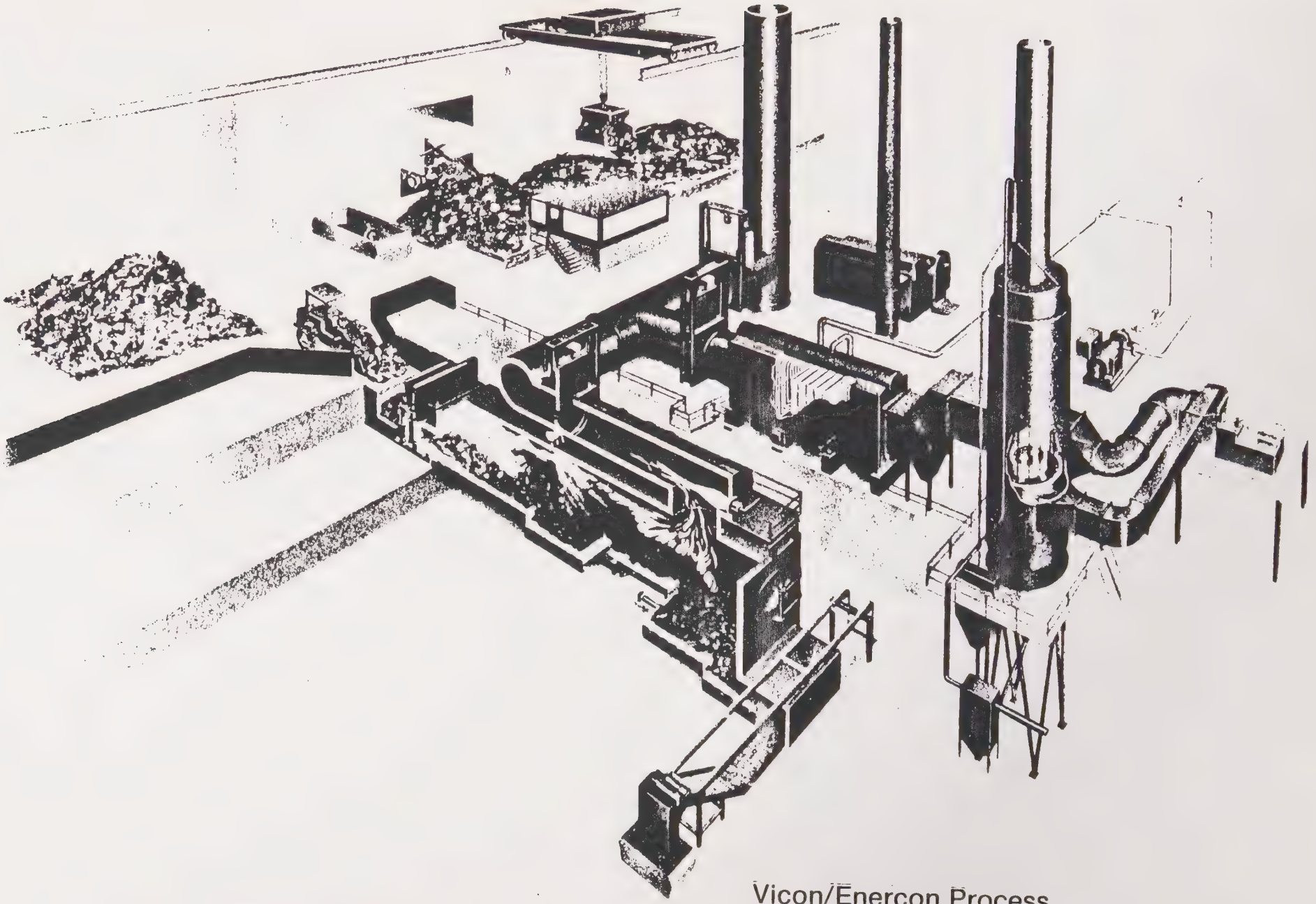
Material Flow and Conversion Process

The MR/WCF proposed by VRS for the City of Berkeley represents the best technology that can be applied to the solution of probelms attendant to disposal of 150-750 TPD of municipal solid waste and the production of usable thermal energy. A comparable facility designed to process 240 TPD of municipal solid waste is currently in commercial operation at Pittsfield, Massachusetts. The process features the economic advantages that an energy recovery program can offer as well as providing for maximum reduction of volume thru combustion with sanitary landfilling for final disposal of waste material (ash and rejects).

The process illustration (attached) depicts the transfer of the "as received" waste from the transfer station tipping floor to the primary combustion chamber for the utilization of a standard rubber tired front end loader. The loader operator is responsible for selecting a balanced stream of waste and charging the automatic ram loader on a timed cycle. The waste is advanced thru the primary combustion chamber with the residual (ash) discharged to a quench trough for conveying to a rolloff container for transport to a selected landfill. The gases exiting the primary chamber enter the secondary chamber where a complete combustion of any gas entrained particles is accomplished under controlled temperature conditions. The gas continues thru the tertiary chamber, where mixing with recirculated flue gas provides final control of the temperature prior to introduction

generator(s) to meet the requirements of the power sales agreement and to optimize revenues from the electrical energy sales.

VRS's experience to date with a similar facility at Pittsfield, Massachusetts has resulted in a 100% availability factor during the first year of operation. The proposed operations and maintenance program and the ruggedness of the individual component design allows VRS to extend a guarantee of 98% availability on an annual basis.



Vicon/Enercon Process

Vicon Recovery Systems, Inc.

Operation & Procedure

The facility will be operated on a 24 hr. a day, 7 days a week basis to satisfy the requirements of Article XII of the Agreement with the City of Berkeley and the Power Sales Agreement with Pacific Gas & Electric Co.

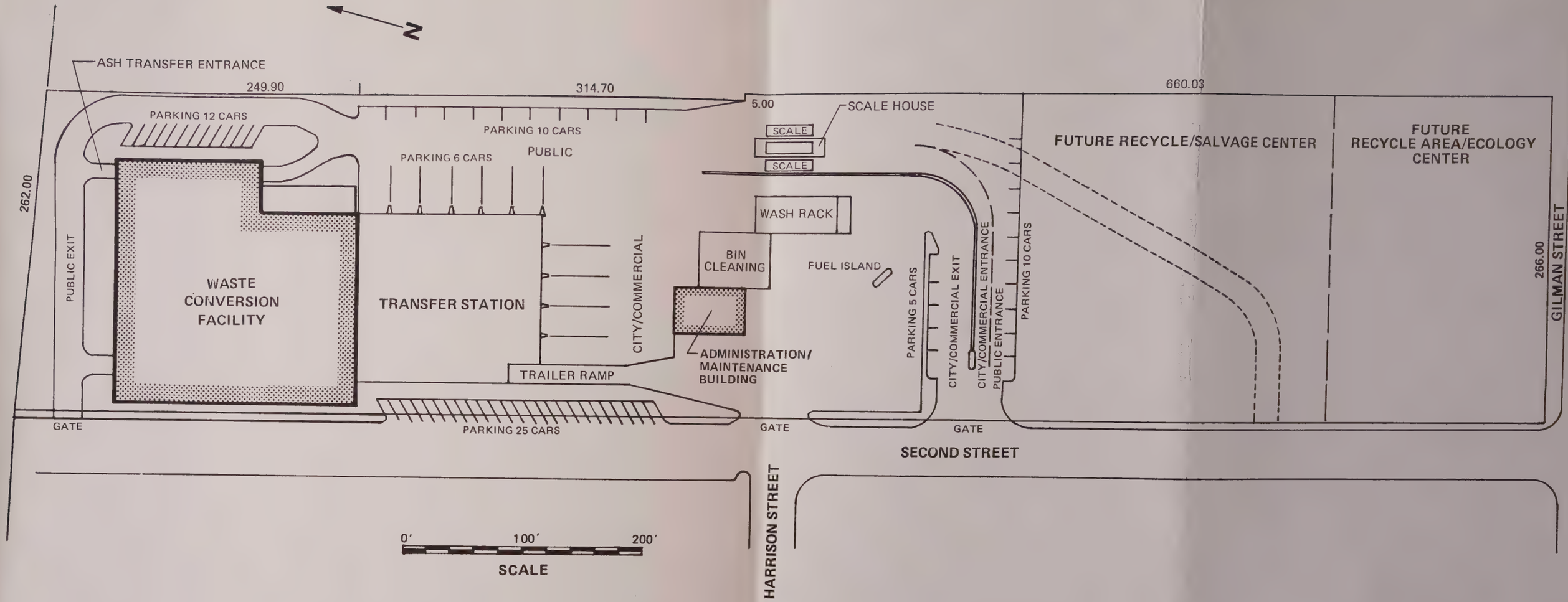
To achieve this continuous operation with 98% availability, VRS proposes an operational and maintenance procedure with proven results at our Pittsfield facility.

The procedure includes the following:

a) Three (3) eight (8) hour shifts, per day, seven (7) days a week.

b) One (1) week annual shutdown for major maintenance and repairs to the combustion equipment, generating equipment and the ancillary equipment.

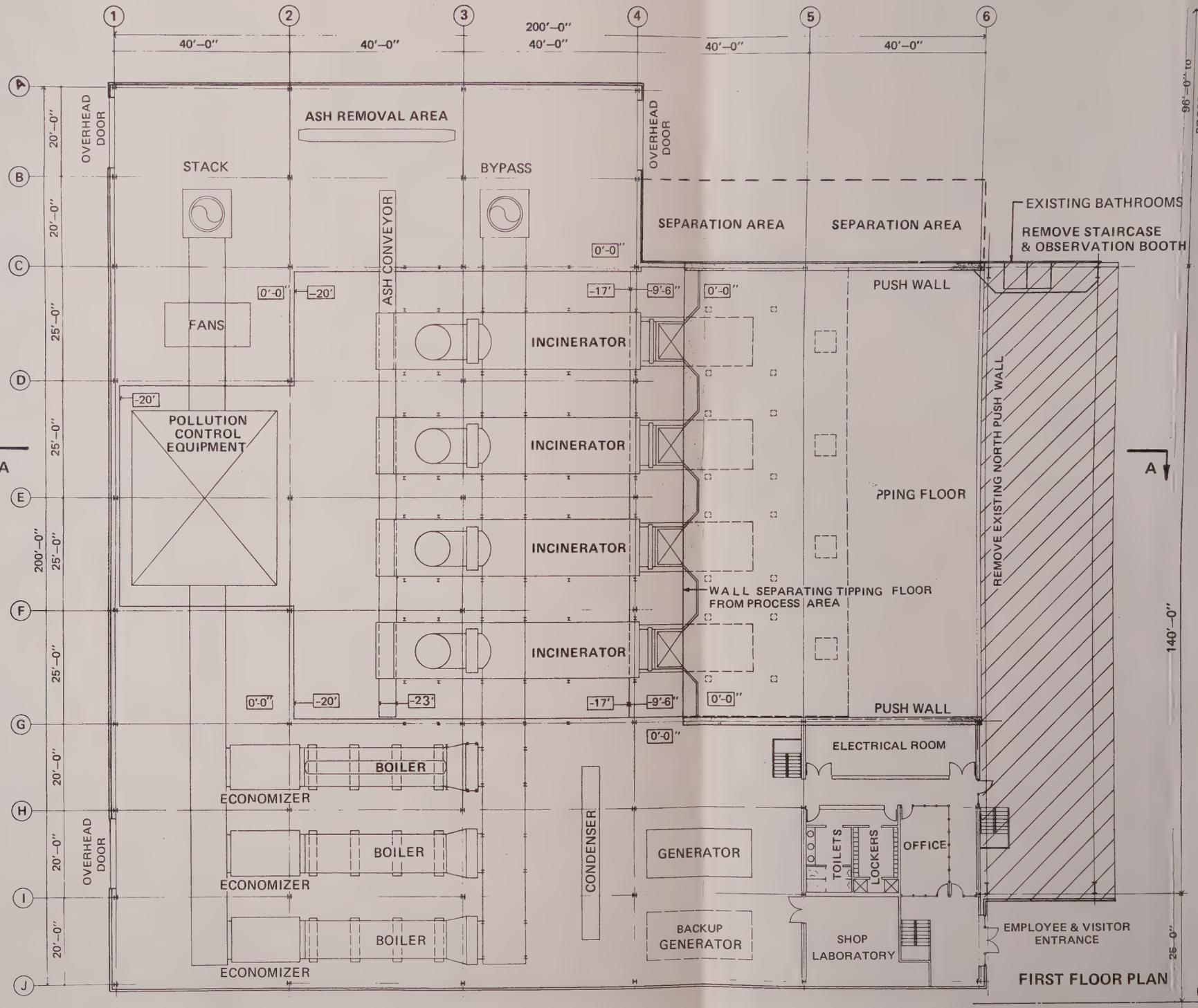
c) Scheduled periodic inspection and maintenance, two (2) days duration, for each of the three (3) boiler trains, to allow for deslagging and minor repairs. Production is maintained at approximately a 20% reduction for this duration.

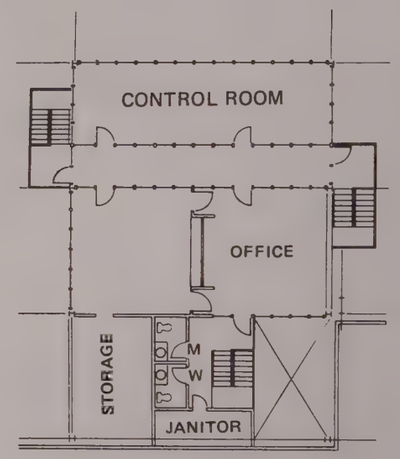


CONSULTING ENGINEERS **PARSONS BRINCKERHOFF** 165 POST STREET SAN FRANSISCO, CALIFORNIA 94108	**VICON RECOVERY SYSTEMS INC.** 10 PARK PLACE • BUTLER CENTER BUTLER, NEW JERSEY	CITY OF BERKELEY **WASTE RECOVERY FACILITY** BERKELEY, CALIFORNIA	FIGURE II 4.2 **SITE PLAN**

FIGURE II 4.3.1

FLOOR PLANS





SECOND FLOOR PLAN

CONSULTING ENGINEERS
PARSONS BRINCKERHOFF
165 POST STREET
SAN FRANSISCO, CALIFORNIA 94108

VICON RECOVERY SYSTEMS INC.
10 PARK PLACE • BUTLER CENTER
BUTLER, NEW JERSEY

CITY OF BERKELEY
WASTE RECOVERY FACILITY
BERKELEY, CALIFORNIA

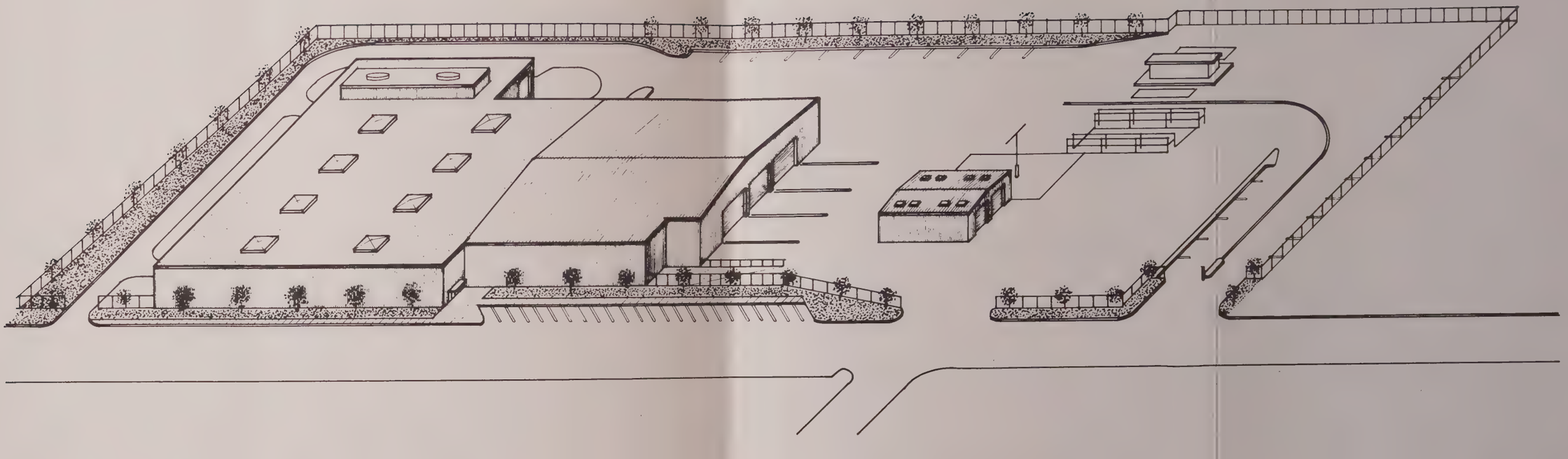


FIGURE II 4.1

PERSPECTIVE

CONSULTING ENGINEERS **PARSONS BRINCKERHOFF** 165 POST STREET SAN FRANSISCO, CALIFORNIA 94108	**VICON RECOVERY SYSTEMS INC.** 10 PARK PLACE • BUTLER CENTER BUTLER, NEW JERSEY	CITY OF BERKELEY **WASTE RECOVERY FACILITY** BERKELEY, CALIFORNIA

Design and Construct

Vicon Recovery Systems, Inc. (VRS) of Butler, N.J., will have overall responsibility for the design and construction of the project and the manufacturing, procurement and installation of process equipment. Construction development, management and supervision, as well as construction equipment and manpower will be provided by a regional, experienced construction company under a bonded subcontract agreement (attached letter of interest) Parsons Brinkerhoff, New York New York, Consulting Engineers, will provide engineering, architectural drawings relative to the project building and appurtenances. Enercon Systems, Inc., Cleveland, Ohio ("Enercon"), the designer of the major combustion equipment components of the project, will provide the process design. Enercon will also provide technical expertise during field installation of the equipment as well as during the shakedown and start-up of the project. Upon completion of construction, VRS will shakedown, test, start-up and operate the project pursuant to the Agreement with the City of Berkeley.

In line with VRS practice, a strong project team will be formed for this project. The team will be managed by the project director (corporate officer) and will include the engineering and construction managers, as well as supporting staffs. The purpose of such a team is to ensure that appropriate design, construction, operating, schedule and financial considerations are blended to satisfy the owner's interests.

VRS's responsibility for the program will be to integrate the process technology of the consultants with in-house detail design

capability, to generate finished plans and specifications for the resource recovery facility. Particular attention will be focused on materials handling requirements of transitions and interfaces to allow for continutity of process flow in the event of a downed component.

In addition to machinery related details, the design staff will develop design details for structural, electrical, HVAC, sanitary and site consideration, and review the proposed vendor capabilities, equipment performance specifications, and submissions for approval. At the conclusion of the construction cycle, those engineers involved during the original designing phase will be assigned to the site to support the debugging phase of the program as well as the acceptance testing.

Control of the design phase of the program will be performed at Butler, New Jersey, utilizing a CPM network developed in parallel with shop drawing schedules and fabrication activities.

Throughout the design phase a design notebook will be maintained with respect to each design feature. This notebook will contain all calculations and working notes to support and justify each selected design feature. It will be the responsibility of the project design engineer to assure that this notebook is maintained complete and current and that it is properly indexed to facilitate access to design data regarding specific design features. This Design Notebook will be available at all times during the design phase at the main design office for inspection by the City of Berkeley or its designated representatives.

All plans and specifications prepared for this project will be approved and signed by at least one professional engineer registered in the State of California. Copies of these plans, specifications, and the Design Notebook will be submitted to the City of Berkely for review prior to commencement of construction. Included with this final design submitted will be a detailed project construction schedule to facilitate progress evaluations during construction of the project.

Status and percent completion reports on the engineering functions will be periodically forwarded to the program office for continuing schedule update. Print control will be rigorously maintained by issuing drawings for approvals, purchasing, and construction needs. Print control shall be a "single source" responsibility, with transmittal and issue number sequences.

Technical and cost evaluations of vendor equipment shall be based on a value analysis program. All shop details and vendor submissions shall be reviewed by the engineering department for conformance to specification and returned with appropriate notations during the construction phase. A record set of drawings will be maintained at the construction site and will be available to the City of Berkeley or its authorized representatives at all times. Notations on control drawings at the conclusion of the program. The design task as proposed, is based upon current practice within the Vicon organization.

The Vicon construction team will be responsible for converting the engineering drawings and specifications into a completed building and site development. As the scope of work for various trades is

defined, re-estimates will be generated while simultaneously the construction manager will solicit bids from subcontractors, evaluate and negotiate contract terms, issue contracts, and define and supervise the scope of work to be performed at the site.

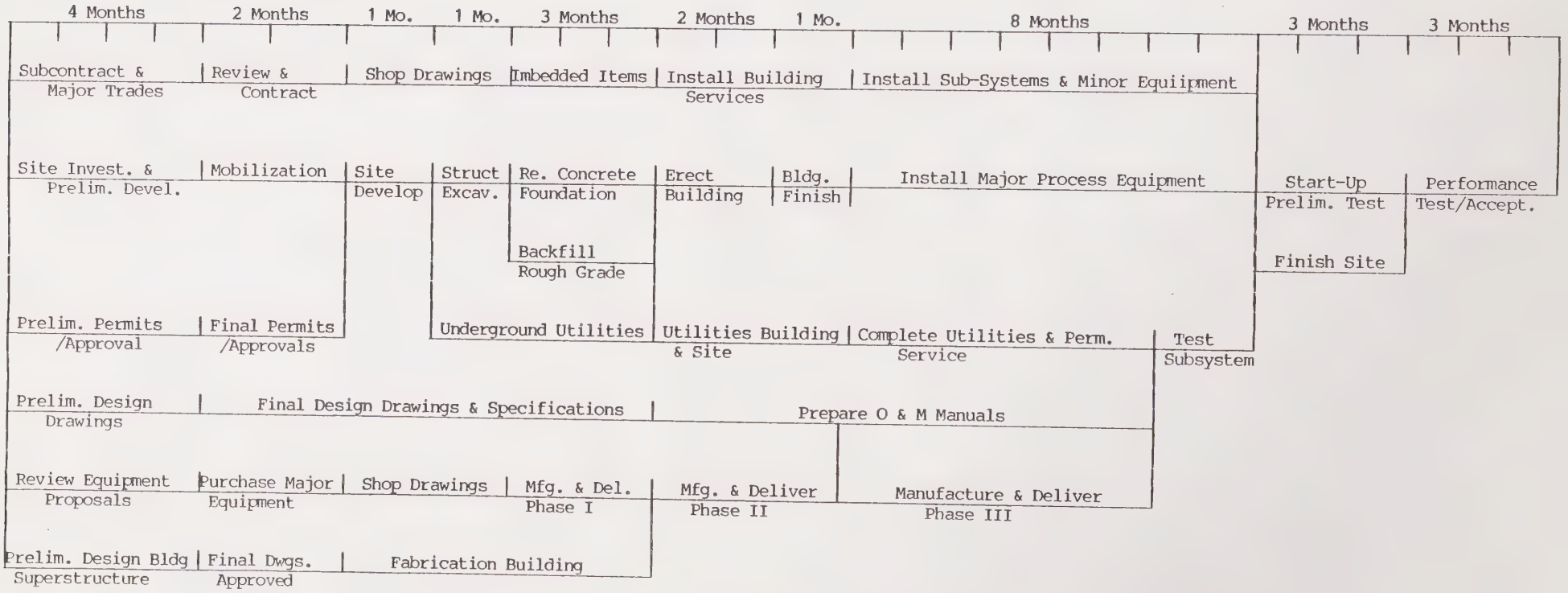
The construction team will be run at the site by a field superintendent with two line superintendents; one responsible for mechanical installation, and the other for site and general construction. They will be supported by a project engineer who will be responsible for drawing control at the site and will interface with the home office drawing control system. The project engineer will be supported by at least one assistant responsible for layout and subcontractor drawings. Updated progress schedules will be available and will assist in their on-site performance. The field superintendent will report to the construction manager in Butler, New Jersey.

All construction methods and activities at the project site will be in accordance with all state and federal rules and regulations relating to minimization of environmental pollution and safety hazards. VRS will be responsible for the procurement and compliance with all necessary permits, licenses, and approvals in accordance with federal, state, and local rules and regulations. Construction personnel employed at the site will be hired based on their skills and capabilities as related to project needs. Certain specialized personnel will be required to possess a valid license pertaining to the type of specialized skill. Employment practices and compensation paid to construction personnel will be in accordance with all applicable federal, state and local laws and regulations.

CITY OF BERKELEY, CALIFORNIA

MATERIAL RECOVERY - WASTE CONVERSION FACILITY

TIME DURATION - 28 MONTHS



Financing

VRS proposes to finance the design and construction of the MR/WCF through a combined leveraged lease/joint venture structure.

The advantages of this structure are significant:

a) It would provide committed funds in advance, making the proposal attractive.

b) It would eliminate the need for equity and much of the working capital from the developer.

c) The implicit cost of financing, and therefore the minimum annual finance charges, will be as low as possible.

d) The developer/operator/designer/engineer should be able to retain a substantial share of the profits.

e) By careful structuring, the developer etc. will be able to participate in the residual.

f) With careful structuring, the developer etc. will be able to retain some of the tax benefits while the rest of the tax benefits will be taken by the financial institution joint venturer.

g) It should provide a flexible propsal that should be comparatively inexpensive to arrange because of the small number of participants involved.

h) There would be the minimum amount of non-productive reserves.

i) Except in rare instances having a financial institution as a joint venture partner should either eliminate the need or greatly facilitate the arranging of construction financing.

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COST PROPOSAL

I. Capital Cost

The capital cost of the facility is estimated to be $11,900,000 including design, construction shakedown, start-up and performance testing costs. The capital cost, as displayed in Form A, does not include construction interest, legal fees, financing fees, working capital or capitalized reserve funds for debt service or replacements. The cost figures are for a facility which can process 72,000 TPY with a system redundancy of 50%. This will allow processing of up to 130,000 TPY. It should be noted that the facility delineated in the Technical Proposal is based on 130,000 TPY with a redundancy of 25%. The larger facility will be built only if the City concluded that it was in its interest to raise the guaranteed throughput to 130,000 TPY. Otherwise, the additional capital cost cannot be supported.

The inclusion of front-end separation equipment is added to the basic cost as Alternative A at an additional $750,000 (see Product Marketing Plan). The projected capital cost of the facility with Alternative A is $12,650,000.

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II. Operations & Maintenance Cost

First year operations and maintenance costs were projected to be $2,092,000 for processing 130,000 TPY and $1,360,000 for processing the guaranteed minimum tonnage of 72,000 TPY. Form B presents the breakdown of those costs. Note that salaries were not broken out by R/TS and MR/WCF because the same staff will be servicing both facilities for better personnel management. Residue and unprocessed waste will be disposed of at the Altamont Landfill. The residue disposal cost in Form B reflects the disposal and haul costs for using that landfill.

III. Revenue

Three sources of potential revenue exist for the MR/WCF: electricity sales, steam sales and sales of recovered materials. At this time however, only the sale of electricity to PG&E has been confirmed. Thus, project economics were based only upon the revenues from electricity sales, while for planning purposes and life cycle cost analysis, all forms of revenue were included.

As displayed in Form C for a throughput of 130,000 TPY, base year electricity sales were projected to be $5,168,000 based on a price of $0.10/kwh in 1984/85. Potential steam sales were $706,000 at a projected price of $6.00/thousand lbs.; and sales of recovered materials of all kinds were estimated

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at $432,000. This brings the estimated first year revenues to a total of $6,306,000.

IV. Proposal Price

1. Monthly Lump Sum Base Operating Fee

The monthly tipping fee for the disposal of the guaranteed tonnage of 6,000 TPM/200 TPD_7 will be $103,200.

2. Per Ton Costs for Excess Tonnage

The fee per ton for disposal of waste in excess of 6,000 TPM/200 TPD_7 will be $17.20/ton. Gross tipping fees from tonnages greater than 80,000 TPY will receive a credit based on the revenue sharing formula described in the next section.

V. Proposed Escalation/Revenue Sharing

1. Proposed Cost Escalation Clause

None

2. Proposed Revenue Sharing Plan

It is proposed that the City share fully in the net revenues derived from the sale of all products of the MR/WCF. This means that as recycling efforts increase, the City will see more benefit. Also, as energy prices increase, the City will share in those enhanced revenues.

It is proposed that the City's share of net revenues be

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related to the amount of tonnage processed at the facility such that the City's percentage share of net revenues increases as more tonnage is processed.

The revenue sharing plan is as follows: the City will get a percentage share of the revenue from all resource recovery sources reduced by (1) the operating expenses of the facility, including debt service, and (2) an incentive management fee equal to 10% of gross revenues. The percentage will vary from 25% to 50%, depending on annual throughput tonnage. Specifically:

Let: R = Gross revenues from electricity, steam and product sales, and tipping fees

E = Operating expenses and debt service, including replenishment of reserves

M = Management Fee = .1 X R

Then: Net revenues subject to revenue sharing = R-E-M = (.9) R-E

The formula for revenue sharing becomes:

Annual Throughput Tonnage	Revenue Share to City
72,000 - 80,000	--
80,001 -100,000	(0.9R - E)/4
100,001 -125,000	(0.9R - E)/3
125,001 +	(0.9R - E)/2

Any tonnage bypassing the processing facility and going only to landfill will not be included in calculating the Annual Throughput Tonnage. At 130,000 TPY, the City receives 50% of the net revenues of the MR/WCF, as defined herein.

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Appropriate records will be made available to the City so that it can calculate the revenue sharing amount.

VI. Estimated Life Cycle Costs

1. Assumptions

a. All data are for 130,000 TPY
b. 1st year revenues are as per Form C
c. 1st year expenses are as per Form B, plus debt service
d. Electricity sales escalate at 10% per year
e. Steam sales escalate at 8% per year
f. Tipping fees remain constant:
   $1,238,000 + (58,000 X $17.20) = 2,236,000
g. Sales from recovered materials stay constant

2. Revenue Sharing

Forms E & F delineate the total cost to the City and its revenue sharing amount for the twenty year lease period. In the first year operation, the City benefits from $1,717,000 in revenue sharing, making the net annual disposal cost to the City only $519,000. In succeeding years, the revenue sharing amount overshadows the basic tipping fee, resulting in net positive revenues to the City, beginning in year 5. By the 20th year of operation, the City's positive revenues from the MR/WCF reaches $7,081,000.

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